

# **The Potential of Renewable Energy Technologies in Wisconsin: Wood Residue for Commercial/Institutional Heat**

Notes from Meeting: February 23, 2005  
(2:30 PM – 5:00 PM)

A draft narrative document providing background material about the three renewable energy markets was distributed by e-mail prior to the meeting. Portions of that narrative are included and appear in italics. The following meeting notes are organized around the Discussion Outline distributed at the meetings.

## **Attendees:**

John Katers, STS (Focus on Energy Renewable Energy Program)  
Larry Krom, L&S Technical Associates (Focus on Energy Renewable Energy Program)  
Bob Terrell, Alliant Energy  
Barbara Samuel, WI DOA Division of Energy  
Paul Helgeson, PSCW  
Don Wichert, WECC (Focus on Energy Renewable Energy Program)  
Ingrid Kelley, ECW

## **Resource Characterization: Wood Residue for Commercial/Institutional Facility Heating**

*Timber is an important resource in Wisconsin, providing the raw material for construction, furniture, textiles, chemicals and paper. Residue from this production is used primarily within the industry. According to the 1999 USDA Forest Service report, Wisconsin Timber Industry – An Assessment of Timber Product Output and Use, residue from Wisconsin production of solid wood products was used for fiber products (including paper pulp) (44%), on-site industrial fuel (24%), industrial fuel sold (7%), domestic fuel (5%), and miscellaneous uses (17%). Only about 2% of the residue was not used.<sup>1</sup>*

*Wood residue available for recycling as fuel comes from the waste stream as products are consumed. Once wood residue enters the waste stream it falls under two primary categories: municipal solid waste (MSW) and construction and demolition waste (C&D).*

*Because it is clean and easily separated on-site, wood waste from residential wood-frame construction is a highly recoverable wood residue resource. According to Falk and McKeever, out of an estimated 3.7 million metric tons of U.S. residential construction wood waste generated in 2002, 3.3 million metric tons, or about 89%, was recoverable. Demolition waste is more problematic because wood from demolition sites is frequently contaminated by paint or hazardous chemicals, or is in other ways more costly to recover. Falk and McKeever estimate only a 30% percent recovery rate for demolition wood waste.*

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<sup>1</sup> Wisconsin Timber Industry – An Assessment of Timber Product Output and Use, United States Department of Agriculture, Forest Service, 1999, page 8

*The wood component in Municipal Solid Waste (MSW) from the residential, commercial, institutional and industrial sectors includes discarded wood products, containers and packaging, production waste from wood products manufacturing, and trees and woody yard waste. Solid wood waste (not including yard trimmings) totaled about 6% of all MSW in 2002 and Falk and McKeever estimate that 10% of this wood was recycled for other uses, and about 22% was combusted, primarily for producing energy. Programs for recycling wood from municipal tree removal and brush collection have focused primarily on chipping and composting methods, although this is a potential source of fuel. The use of wood residue as fuel requires a reliable supply that is of consistent quality. This supply must also be on site or within an economically viable transport distance. Construction waste and municipal tree and brush removal are potential future sources of waste wood for commercial heat.*

*Two sources of wood residue are reliable and available in their local areas. These are wood milling companies and others that make things of tree parts (non-pallet residue), and businesses that receive wood as shipping materials for other products and materials (pallet residue).*

### **Wood Residue in Wisconsin**

*According to the most recent Wisconsin Wood Residue Study,<sup>2</sup> each year the manufacturing sector in Wisconsin disposes of at least 500,000 tons of wood residue, or about one quarter of the residue it produces, costing businesses about \$7,000,000 annually. Unutilized residue (both pallet and non-pallet) is primarily generated in southeastern Wisconsin although there are sources distributed around the state.*

The group suggested that more recent data should be available for quantities of residue produced within the state. Also, the characterization does not include mention of logging residue which can be substantial.

### **Market Channels and Actors**

- Primary sources of residue in the state:
  - Forest management
  - Logging (forest) residue
  - Mill residue
- Secondary sources of wood residue:
  - Wood products manufacturing
  - Shipping waste (pallets and other wooden shipping materials)
  - Urban tree trimming and removal
  - Construction waste
  - Demolition waste
- Market Actors
  - Logging companies

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<sup>2</sup> Everson, Vern A. and Hubing, Nicholas R., *Wisconsin Wood Residue Study: Wood Residue from Manufacturing Excluding Sawmills*, October 1993, Wisconsin Department of Natural Resources Bureau of Forestry, Publ-FR-075-93

- Manufacturers of wood products
- Businesses or institutions within range of an economically transportable wood residue source
- Utilities (tree trimming and removal operations)
- Third party energy developers/operators
- Construction/demolition contractors
- Municipal solid waste departments (tree recycling)
- Vendors of wood burning boilers and equipment

### **Motivations for Using Waste Wood for Facility Heating in Wisconsin:**

- Rising cost of natural gas (Lower fuel costs – Comparative costs to other fuels (see Canadian Buyer's guide for 1998 comparison, or use newer data if available))
- Pallet manufacturers are required to heat their pallets to a certain temperature to kill resident nematodes
- Disposal costs can be eliminated for wood residue that can be used for fuel
- Potential Renewable Energy Credits
- *High availability, fairly stable prices*
- *A proven technology that is highly flexible and can be used in a variety of applications*
- Indirect financial advantages:
  - Wood residue is a product that primarily benefits the local economy because it is most cost effective when used locally, and because collection, processing and transport is more labor intensive than fossil fuel delivery, creating more jobs locally
  - *Source can be sustainably managed, and using the waste for heat eliminates environmentally negative disposal strategies*
- Green ethics: wood residue is CO<sub>2</sub> neutral, very low to no sulphur in emissions (acid rain)

### **Barriers to Developing Wisconsin's Waste Wood Energy Potential**

- Lack of resource brokers: The lack of an efficient and reliable infrastructure for recovering and transporting this material
- Space constraints on large units and fuel storage requirements: Closed storage of wet wood can deplete oxygen or cause spontaneous combustion; the latter can also happen with dry wood waste in closed storage
- Grinding process is required before residue becomes useable fuel
- Wisconsin Department of Natural Resources requires an air permit for systems that generate 5 million btu's per hour or more: additional potential air quality standards and other environmental approvals (for control of plume opacity, particulate emissions, greenhouse gasses, and carcinogens)
- Competing markets: source is the most important factor in costs, but alternative uses for the material may also drive up prices in the long run
- Stable supply required for any given system
- Collection/Recoverability of wood residue

- Transportation limitations: distance for transporting fuel/ geographic distribution of wood waste resources
- More labor-intensive than using natural gas
- Inconsistent water content and quality of residue: overall quality and energy content of wood waste varies
- Vendor/installer skills uneven
- Lack of certification for furnaces and boilers
- *Greater complexity of technology requires higher level skill for O&M*
- *Moisture content of wood waste can affect transport costs and efficiency in burning; also emissions are higher with more moisture*
- *Ash management and disposal*
- *Availability and cost of fire insurance; other safety issues*
- *Limitations on availability of information about these systems*
- *Most systems have fossil fuel backup*

### **Program Approaches**

The following are specific programs that could be used as models for estimating achievable potential for use of wood residue as commercial/institutional heating fuel in Wisconsin:

- Project incentives: Not necessarily large, but something to attract potential projects (incentive levels tailored to size and location of businesses)
- Demonstration grants for individual systems and district heating systems
- Coordinated resources program – (matching residue supply with demand)
- Develop business model templates and demonstrations of these models
- Targeted marketing to specific types of businesses and institutions within range of available resources

### **Additional Comments, Suggestions and Resources**

1. There is a sustainable forestry program operated by a tribe in Menominee County
2. In St. Paul, MN, a district heating system that uses 1/3 pallets and 1/3 wood from urban forestry sources
3. We Energies has a data base of the available wood resource in Milwaukee (C Siegrist)
4. John Katers has two students looking at the waste wood resource in Wisconsin. Study will not be completed for a while, but they may have information to share.
5. Check out biomass programs in the following other states:
  - a. California
  - b. Georgia
  - c. Minnesota
  - d. Maine
  - e. Biomass Energy Resource Center in Montpelier, VT
6. Dan Moran of DOA did an economic evaluation of its wood waste incentive program – perhaps report is still available (B Samuel)

7. Is there a saturation level for these projects through a program? There are 175 different industries using wood heat, according to a 1998 study on facilities using wood waste (need citation for this study)
8. We should be sure to define the standard of system we are studying the potential for:
  - a. “Automatic feed” systems
  - b. Using combustion fan
  - c. Meeting EPA and DNR standards
9. Check out:
  - a. FOE Report for Northern Tier: NW Regional Planning
  - b. Forest Residue: Badger RC&D, Platteville has recent data